

DOE SR Qualification Standard
COURSE MATRIX
INSTRUMENTATION & CONTROL

Topical Area	Course	Competency	Description	Hours	Provider
Electrical Engineering	Course # 0542 Electronics for Electricians	1.1 - 1.3, 1.13, 1.20	Hands on course provides participants with a fundamental knowledge required to maintain and troubleshoot electronic equipment. Participants use oscilloscopes and digital test equipment to analyze and monitor circuit parameters, which further their understanding of circuit operation.	40	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Systems Engineering	Course # 9962 Industrial Ergonomics	1.14	This course focuses on the proactive application of ergonomics in the design of workplace methods and layout. Proactive ergonomics in the design of manufacturing operations has become increasingly important as incidents of cumulative trauma disorders (CTDs) rise and regulatory efforts to deal with the problems become more rigorous. In addition to safety concerns, proactive ergonomics technology contributes to the effectiveness and productivity of manufacturing processes and has a significant impact on product quality and the health, safety, and motivation of workers.	24	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Thermodynamics, Heat Transfer, and Fluid Flow	ETT565 Applied Thermodynamics	1.15, 1.16	Course covers the following topics: Use of tables and charts to obtain properties of temperature, pressure, volume, internal energy, enthalpy, and entropy. First law of thermodynamics for steady-flow systems and for closed systems. Ideal gas equations and processes.	5	Clemson University 5004-024 Kay James
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 864 656-2200	

Mechanical Engineering	ETT304 Mechanical Systems and Components	1.17, 1.21	Course looks at major mechanical equipment and systems found at DOE facilities. Students will learn engineering fundamentals and practical applications as well as basic safety issues concerning mechanical systems.	24	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Chemical Processing	Chemical Fundamentals (CBT)	1.19, 1.24	CBT course designed as an overview that will enable the student to understand the chemical principles involved in maintaining proper chemistry control at DOE facilities. Example topics: Basic Chemistry, Chemical Properties, Chemical Control Process, DOE Concerns. (93-3)		DOE-Richland
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 725-5795	
Maintenance of Electrical Systems	Maintenance Management	1.25	Course is designed within a total quality management framework to establish and enhance the process standards of industrial facility maintenance organization. This course also specifically addresses the implementation efforts of first-line or facility representative personnel who conduct/evaluate maintenance.	16	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 649-0515	
DOE Order 6430.1A, General Design Criteria	ETT443 Applying Codes and Standards at DOE Facilities	2.1	Course presents a comprehensive overview of select codes, standards, and regulations affecting design, construction, and operation of a DOE facility. Learn how codes and standards can be effectively used to modify and maintain DOE facilities.	24	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	

DOE Safety Documentation	ETT306 Safety Documentation (Module 9)	2.11 - 2.13	Focuses on the fundamental objective of DOE - to operate its facilities in a safe and environmentally sound matter. Requirements for safety documentation will be presented and their interpretation and implementation discussed.	8	General Physics
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 800 669-4782		
Record Keeping Requirements	DOE102: Operating Experience Analysis & Feedback	3.2	The purpose of the workshops is to explain the new occurrence Reporting & Performance Indicators Orders.	7	DOE EH-74
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 803 724-9729		
IEEE Safety System Standard	IEEE Standard 603-1991, Standard Criteria for Safety Systems for Nuclear Power Generating Stations	2.4	Self-Study		
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number		
Selected DOE Orders	DOE Orders 4700.1, Project Management System, 5700.6C, Quality Assurance, 5480.20, Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities 4330.4 Maint	2.3, 2.10, 3.3, 4.12	Self-Study		
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number		

Communication Protocol	COS136 Communication Workshop	3.1	Focus is on the barriers to communication and how we deal with other people in our organization on a daily basis.	16	WSRC HRD 10180
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 725-9729	
Project and Contract Management	MST270 Project Planning	4.1 - 4.4, 4.10	Course will provide participants with an understanding of roles, responsibilities, authorities, and elements of work critical to project management in DOE. Covers topic such as, project planning and front end loading, pre-conceptual documentation, functional analysis, managing conceptual design, assessing project risks, best practices.	40	DOE-HQ (HR)
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 725-9729	
Conducting Performance-Based Assessments and Inspections	QAT115 Lead Assessor / Auditor Training	4.5, 4.6	Develops the knowledge and skills necessary for planning, performing, and reporting QA audits and other SR assessments	40	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 649-4782	
Problem Analysis	OTT164 ORPS (Occurrence Reporting and Processing System) Overview	4.7, 4.8	Introduces the user to ORPS and addresses system logistics; identifies user requirements and responsibilities; and addresses the design features of electronically reporting occurrences. The class addresses the facility representative and program manager sign-off screens.	7	EG&G System Safety Development Center
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 725-9729	

Subject Matter Expert and Technical Reviews		4.9, 4.11	Self-Study		
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number		
Thermodynamics, Heat Transfer, and Fluid Flow	ETT575 Applied Heat Transfer	1.15, 1.16	Course covers the following topics: Steady-state conduction through composite walls and cylinders. Transient conduction, systems with heat sources, forced convection and natural convection coefficients, simplified expressions for common fluids.	5	Clemson University 5004-024 Kay James
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 864 656-2200		
Thermodynamics, Heat Transfer, and Fluid Flow	ETT587 Applied Fluid Mechanics	1.7, 1.8, 1.12-1.16	Course covers the basic concepts of fluid behavior followed by practical applications of fluid flow in ducts, fluid machines, flow measurements, external flows, with an introduction to fire protection. Application in both compressible and incompressible flows.	5	Clemson University 5004-024
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 864 656-2200		
Problem Analysis	QTFSES Root Cause Analysis	4.8	Application of Root Cause Analysis to a variety of programs, including incident investigations, management evaluation, corrective action, etc..	4	WSRC
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 803 725-9729		

Electrical Engineering	Course # 9402 Basic Protective Relaying	1.1-1.3, 1.13, 1.20	Course designed for entry level, provides thorough introduction to the theoretical and practical aspects of the relay protection field. Hands-on exercises focus on proper and safe operation of relay test equipment, and provides basic insight into the basic workings of electromechanical protective relays.	40	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Electrical Engineering	Course # 8805 Electrical Industrial Plant Maintenance	1.1-1.3, 1.13, 1.20	Course designed for electricians, technicians and engineers who deal with the maintenance of industrial facilities. Emphasis is on industrial plants and process production works. Topics include, plant power distribution equipment, motor controls, and protective devices.	40	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Electrical Engineering	Course # 8807 Motors and Motor Controllers	1.1-1.3, 1.13, 1.20	Hands-on AC/DC motor theory including polyphase induction motors, synchronous motors, motor control center construction, controller fundamentals, circuit design, reduced voltage starters, solid state controllers, variable frequency drives and programmable logic controllers.	40	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Electrical Engineering	Course # 9116 Generators and Voltage Regulators	1.1-1.3, 1.13, 1.20	Course provides a thorough working knowledge of electrical power generators and their associated voltage regulation systems. Focuses on large utility equipment and backup emergency generator units, but also applies to smaller (<500KW) equipment.	40	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	

Electrical Engineering	Course # 8808 UPS Systems	1.1-1.3, 1.13, 1.20	Hands-on course provides technicians and engineers with a working knowledge of the operating theory behind power inverters, converters, and UPS. Static inverter technology, UPS arrangements, and major UPS circuits, such as synchronization and static switching are also included.	40	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Electrical Engineering	Course # 8806 Diesel Generators and Controls	1.1-1.13, 1.13, 1.20	Course is designed to provide the knowledge to operate and maintain diesel generators and control systems. Topics include start-up controls, Woodward governor adjustments and maintenance, generator and exciter maintenance, voltage regulators, protective equipment, troubleshooting, and operating diesels under various loads.	40	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Electrical Engineering	Course # 0543 Power Distribution and Switchgear Maintenance	1.1-1.3, 1.13, 1.20	Course focuses on maintenance of distribution system switchgear. Includes an understanding of specific distribution configurations, switching operations, key interlocks, system lockout requirements, breaker lockout procedures, and distribution system maintenance techniques.	24	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Process Instruments and Controls	ETT114 I&C for DOE Technical Personnel	1.4- 1.12	This course explains how various processes (temperature, pressure, level, flow, and valve position) are measured and indicated at DOE nuclear and non-nuclear facilities. Methods used for automatic process control, including the operations of two-position and proportional controllers, are also included.	16	TM Consultants
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 557-3380	

Process Instruments and Controls	ETT530 Process Instrumentation	1.4-1.12	This course provides an overview of basic process instrumentation principles, technology, symbology and formulas.	28	DOE-HQ (HR) EF009
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 725-9729	
Civil Engineering	Seismic Design & Performance of Building Structures	1.18	Day one covers seismic design approaches, current building code theory, and design principles for providing seismic resistance in structures. Day two concentrates on performance of actual structures subjected to earthquakes and methods for evaluating performance. Meets Illinois Structural Engineering Board requirements.	16	American Society of Civil Engineers
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 548-2723	
Civil Engineering	ANS-2.2-1988 Earthquake Instrumentation Criteria for Nuclear Power Plants	1.18	Self-Study. This standard specifies earthquake instrumentation for the site structure and equipment of light water-cooled, land-based nuclear power plants and may be used for guidance, where appropriate, at other types of nuclear power plants.		American Nuclear Society
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 708 579-8268	
Civil Engineering	Seismic Qualification of Equipment Using the Seismic Qualification Utilities Group (SQUG) Experience Based Methods	1.18	Review of Earthquake Experience Data and its application to the evaluation of electrical and mechanical equipment. Includes: MCC, switchgear relays, transformers, instruments, diesel-generators, pumps, valves, fans, conduits, and cable trays. DOE-specific equipment include: piping systems, masonry walls, glove boxes, HVAC ducts. Course includes developing equipment list, recognizing seismic vulnerability in each type of equipment, calculating seismic demand and capacity, performing interaction reviews. The course includes hands-on walkdowns. Five years of seismic qualification experience and attendance to this course are prerequisites for applying the SQUG method.	40	Seismic Qualification Utilities Group George Antaki
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 952-9728	

Civil Engineering	EJCDC Engineering and Construction Documents	1.22	The Engineers Joint Contract Document Committee (EJCDC), a collaboration of ACEC, NSPE/PEPP, and ASCE, has developed and continually updates standard documents for use in construction projects. Day one of this seminar is an overview of the new EJCDC engineering and construction documents with concentration on Owner-Engineer, Multi-Prime, and other engineering agreements. Day two discusses on specifying and enforcing insurance bonds, dispute resolution and the competitive bidding process, construction site safety, and owner-contractor agreements. Seminar price includes \$400 worth of 1997 EJCDC documents.	16	American Society of Civil Engineers
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 800 548-2723 x6156		
Civil Engineering	FG15: Understanding & Applying Control Systems Documentation	1.22	Methodology for the design and development of control systems documentation will be presented. The development of piping and instrument diagrams (P&IDs), loop diagrams, and specification forms is emphasized.	16	Instrument Society of America
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 919 949-8411		
ISA Pneumatic System	TI05: Installing, Calibrating & Maintaining Pneumatic Instruments	2.5	Correct installation, calibration, and maintenance of pneumatic instruments is covered. Explains how pneumatic instruments function in the control loop.	24	Instrument Society of America
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 919 549-8411		
ISA Process Control Instrumentation Standard	FG05: Understanding Industrial Processes, Measurement and Control	2.6	An overview of industrial measurement and control will be presented. Using a general non-mathematical approach, students are provided with a foundation for communication with control system professionals.	24	Instrument Society of America
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 919 548-8411		

ISA Drawing and Symbol Standards	FG15: Understanding & Applying Control Systems Documentation	2.7	Methodology for the design and development of control systems documentation will be presented. The development of piping and instrument diagrams (P&IDs), loop diagrams, and specification forms is emphasized.	16	Instrument Society of America
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 919 549-8411	
ISA Environmental Condition Standard	ES10: Understanding & Applying Instrumentation in Hazardous Locations	2.8	Provides detailed, systematic approach to the specification and implementation in hazardous locations. Related standards from National Fire Protection Association (NFPA), National Electrical Manufacturers Association (NEMA), International Electrotechnical Commission (IEC), American Petroleum Institute (API), and ISA are stressed.	16	Instrument Society of America
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 919 549-8411	
ISA Environmental Condition Standard	EC40: Applying PLC Strategies and Systems	2.8	Provides the information needed to implement programmable logic controllers (PLC) in your plant. Focus on the strengths of PLCs, PLC jargon, design and specification of PLC systems, networking, efficient programming techniques, project estimating, and start-up.	24	Instrument Society of America
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 919 549-8411	
ISA Control Valve Standards	EI30: Sizing, Selecting & Applying Control Valves, Actuators & Positioners	2.9	A practical understanding of control valves, actuators, and positioner designs and their applications. Provides methods that can be used to identify specific valve problems and arrive at acceptable solutions within engineering tolerances.	24	Instrument Society of America
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 919 549-8411	

Technical Reviews	ERDUSQ01: Unreviewed Safety Questions	4.11	Train Safety Evaluation Originator and Managers on USQ process for qualified reviewer. Facility Operations Safety Committee member requirement.	8	WSRC
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 725-9729	
Technical Reviews	Unreviewed Safety Question Determination	4.11	Provides an explanation of 10 CFR 50.59 and its application. Practical exercises are provided for USQ determination, and reviewing USQ determinations. Management reviews and industry experience are also addressed.	8	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
DOE Order 5700.6C	ETT682 -GTBQS-ITV: Section 4, Quality Assurance	2.10	This workshop address Section 4, Quality Assurance, of the General Technical Base Qualification Standard. This course is a videotape of a previously broadcast Interactive Television Broadcast (ITV) format, presented by the DOE Safeguards and Security Central Training Academy in Albuquerque NM.	2.5	DOE Kay Moody
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 725-5795	
Project Management	PMC10: Project Management Overview	4.1 - 4.4, 4.10	The course provides instruction in the DOE Project Management System, and gives an overview of a DOE Project Manager's responsibilities for managing project initiation, planning, execution, transition, and closeout. Documentation and administrative responsibilities are also covered.	80	DOE-HQ (HR)
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 725-9729	

Project Management	PMC10: Project Management Overview	2.3, 3.2, 4.1 - 4.4, 4.10	The course provides instruction in the DOE Project Management System, and gives an overview of a DOE Project Manager's responsibilities for managing project initiation, planning, execution, transition, and closeout. Documentation and administrative responsibilities are also covered.	80	DOE-HQ (HR)
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 202 426-1329		
Training and Qualification Oversight	006: Management and Oversight of Training and Qualification Programs	3.3	This seminar is designed to analyze the competencies required for successful work performance and design appropriate training and development activities to enable people to develop those competencies. Covers DOE Order 5480.20A and/or 360.1	8	DOE EH-31
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 803 725-9729		
Safety Analysis Reports	SAF103: Safety Analysis Reports (SAR) Course	2.13	Topics include: overview of DOE Order 5480.23; documenting the safety envelope; determining hazard classification; overview of SAR development; identifying related documents and references; incorporating accident analysis data into the SAR; describing safety systems; determining appropriate design and operation commitments; derivation of TSR's; appropriate use of site-specific SAR's; and updating the SAR.	24	DOE EH-74
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 803 725-9729		
Technical Safety Requirements (TSR's)	SAF131: Technical Safety Requirements Course	2.12	To provide uniform training in content and level on Technical Safety Requirements (TSR) preparation	16	DOE EH-74
Qualification Standard INSTRUMENTATION & CONTROL			Phone Number 803 725-9729		

Systems Engineering	7789 Auto CAD - Level Two	1.23	Advanced aspects of Auto CAD such as creating and using scripts, working with attributes, basic customization techniques, importing and exporting files, working with reference files. This course is intended for Engineers, Designers, Drafters, Technicians, etc..	16	General Physics
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 800 669-4782	
Problem Analysis	QQMA1010 Quality Assurance Orientation	4.10	Course covers basic concepts of Quality, the evolution of Quality Assurance Programs, the 10 criteria of 10 CFR 830.120, the value-added requirements articulated in the Safety Rule, and the program elements of the WSRC Quality Assurance Manual.	4	WSRC
Qualification Standard INSTRUMENTATION & CONTROL				Phone Number 803 725-9729	
Problem Analysis	Configuration Management in the DOE	4.10	Examines the guidance available to DOE personnel and contractors in their efforts to develop and implement configuration management (CM) programs for affected DOE facilities and processes.	8	General Physics
Qualification Standard				Phone Number 800 669-4782	